Fisheries and Oceans Canada | Pêches et Océans Canada
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Canadian Science Advisory Secretariat
Maritimes Region | Science Response 2016/030

SCALLOP FISHERY AREA/TIME CLOSURE TO PROTECT COD SPAWNING AGGREGATIONS IN 5Z (GEORGES BANK)

Context

The requirement to account for all fishing mortality of Georges Bank Atlantic Cod (*Gadus morhua*) in Canada has led to efforts by the offshore scallop fishery to reduce cod bycatch. Along with active avoidance protocols adopted by the offshore scallop fleet, Fisheries and Oceans Canada (DFO) has implemented area/time closures from early February to the end of March since 2005 to reduce bycatch and minimize disturbance to spawning aggregations of cod by the offshore scallop fishery on Georges Bank. To assist resource managers in determining appropriate area closures for the offshore scallop fishery on Georges Bank during the cod spawning seasons, fisheries management asked the following question: "What does a review of Eastern Georges Bank (unit areas 5Zj and m) cod distribution, particularly at spawning time, reveal about the spatial trends of the species and its overlap with the offshore scallop fishery? Highlight potential areas of high 5Zjm cod concentration using the cells previously defined and used."

This document provides information on the spatial distribution of cod abundance on Eastern Georges Bank during the spawning period based upon the DFO February/March Georges Bank Research Vessel (RV) survey and its overlap with scallop catches on the Canadian portion of Georges Bank. In the 2013 analysis, the most recent 10-year spatial distribution of cod was compared to the whole time series (starting in 1996). The results of this analysis showed that a change in distribution had occurred (DFO 2013). It was determined that using the most recent 10-year moving window to examine the spatial trends of cod distribution during the spawning period should achieve the objective of reducing cod bycatch and disturbance of spawning aggregations. Therefore, this analysis uses data on cod distribution from 2006 to 2015.

This Science Response Report results from the Science Response Process of January 12, 2016, on the Status Update for Scallop Fishery Area Closures to Protect Cod Spawning Aggregations on Georges Bank.

Analysis and Response

The 2015 first quarter Canadian offshore scallop catches on Georges Bank correspond to approximately 5% (214 metric tonnes (mt) of meats) of the Total Allowable Catch (TAC) for the year, which is below the long term average percentage for the first quarter (16% since 1990). At the start of the 2015 fishery (January), there was one industry-managed juvenile scallop closure area in place (outlined in blue in Figures 1 and 2). It opened on June 1, 2015.

The information used in this analysis has been updated with the 2015 cod abundance data on Eastern Georges Bank obtained from the annual DFO RV survey, as well as, scallop catches from the Canadian offshore scallop fishery logbooks. Details on the methods for this analysis can be found in the Maritimes Region Science Expert Opinion 2006 (DFO, 2006). Information from the DFO RV survey for 5Zjm conducted during late February/early March was used to identify areas of high aggregations of adult (age 3+) cod. The distribution of age 3+ cod was plotted on a grid of 5-minute longitude by 3.33-minute latitude cells (approximately 12.5 nautical

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miles^2 or 43 km^2 per cell). Cod abundance data were "standardized" by dividing the number of cod per tow by the mean number per tow for the strata representing 5Zjm for each year of the survey. These standardized estimates were averaged in each cell over the 2006 to 2015 time period. This has the effect of diluting the influence of very large tows and reducing between-year variability. In a previous analysis, the most recent 10-year spatial distribution was compared to the whole time series (starting in 1996). This comparison showed that a change in distribution had occurred, indicating that the full time series did not adequately reflect recent changes in cod distribution (DFO 2013).

The cells with an average of 3.5 or more standardized age 3+ cod/tow for the last decade were numbered 1 to 14 in order of decreasing abundance (Figure 1). These cells were compared to 2015 first quarter scallop catches (Table 1). Of the 15 cells ranked in the previous year's analysis, 13 remained as ranked cells in this analysis. Cell 9 in this analysis was not ranked last year and one cell ranked last year was not ranked this year.

The 2015 scallop fishery cod closure contained 6 currently ranked cells (see asterisks for cells 2, 3, 5, 7, 8 and 10; see Variation Order 2015-017) (DFO 2015). The strongest aggregation of cod occurred in an area near the center of the bank; however, there were also noteworthy high density cells of 3+ cod on the southern part of the bank (cells ranked 2 and 3).

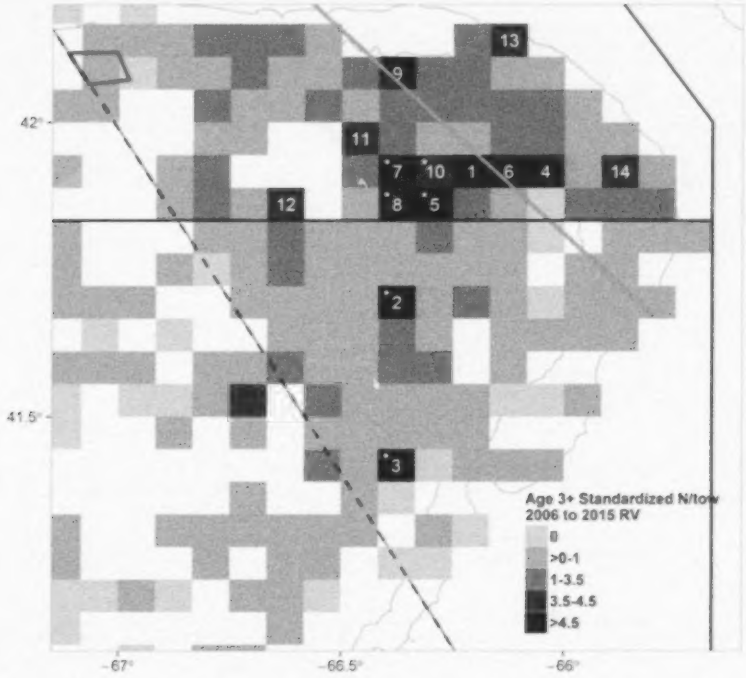

Figure 1. Distribution of aggregated age 3+ cod on Eastern Georges Bank in late February/early March from DFO research survey data (2006 to 2015). The number per tow (N/tow) has been standardized by dividing the N/tow by the mean N/tow for the whole area, i.e. 5Zjm, for each year of the survey and then averaged in each cell from 2006 to 2015. Cells representing 3.5 or more standardized N/tow were ranked (highest to lowest, Canadian side only). Cells that were part of the 2015 scallop-fishery cod closure are indicated by an asterisk (*). The industry-initiated scallop-fishery closure area in place for the first quarter of the 2015 scallop fishery is indicated by the blue box. The horizontal black solid line demarcates NAFO divisions 5Zj and 5Zm. The diagonal red line demarcates the Georges Bank scallop management areas 'a' and 'b'. The diagonal dashed line indicates the Canada/USA ICJ line.

Table 1. Association between 2015 Eastern Georges Bank first quarter scallop catch (mt of meats) by the Canadian offshore scallop fleet and cells of high cod density (cells with 3.5 or more standardized age 3+ cod on average in February/March RV survey data from 2006 to 2015). The cod cells, numbered 1 to 14, are in descending order of cod abundance. Greyscale rankings indicate the abundance of scallop catch that corresponds to each cell of high cod density.

Year/Cod	1	2*	3*	4	5*	6	7*	8*	9	10*	11	12	13	14
2015	2	0	0	0	0	0	0	0	0	0	7	0	0	0
2014	0	0	0	0	0	0	0	0	7	0	96	0	0	0
2013	0	0	0	0	0	1	0	0	7	0	4	0	0	0
2012	11	0	0	0	26	0	12	13	0	4	1	0	0	0
2011	0	0	0	0	26	0	6	8	0	8	7	0	0	0
2010	1	0	0	0	4	0	0	0	0	0	12	5	0	0
2009	9	0	0	0	1	0	4	0	12	2	32	1	0	0
2008	110	0	0	0	58	0	0	0	55	84	35	0	0	0
2007	2	0	0	0	1	0	1	0	0	0	373	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0

** indicates cells that were part of the 2015 closure*

Legend: Scallop Catch
Colour: Scallop Catch (mt of meats)

50 = Catch ≥ 50
25 = catch < 50
10 = catch < 25
5 = catch < 10
0 < catch < 5
Catch = 0

Only 2 of the top 14 ranked cod cells had scallop landings in Q1 of 2015 (cells 1 and 11, Table 1). These 2 cells had a total of 9 mt of catch for this period (approximately 4% of the total Canadian Q1 scallop catch of 214 mt on Georges Bank).

The cells selected for closure in 2015 (see asterisks in Figures 1) had no Q1 scallop landings prior to the closure, which began on February 1, 2015. A closure similar to 2015 based on the top ranking cells would have a relatively low impact on the offshore scallop fishery if the 2016 Q1 scallop fishing distribution is similar to that of the first quarter in 2015 (Figure 2). This low impact may be the result of the displacement of scallop fishing to other areas in the first quarter, perhaps due to the cod area/time closures and voluntary scallop fishery closure areas.

If scallop fishing in Q1 is confined primarily to 5Zj, as it was in 2015, closure of cells ranked 2 and 3 would have no effect on scallop catches.

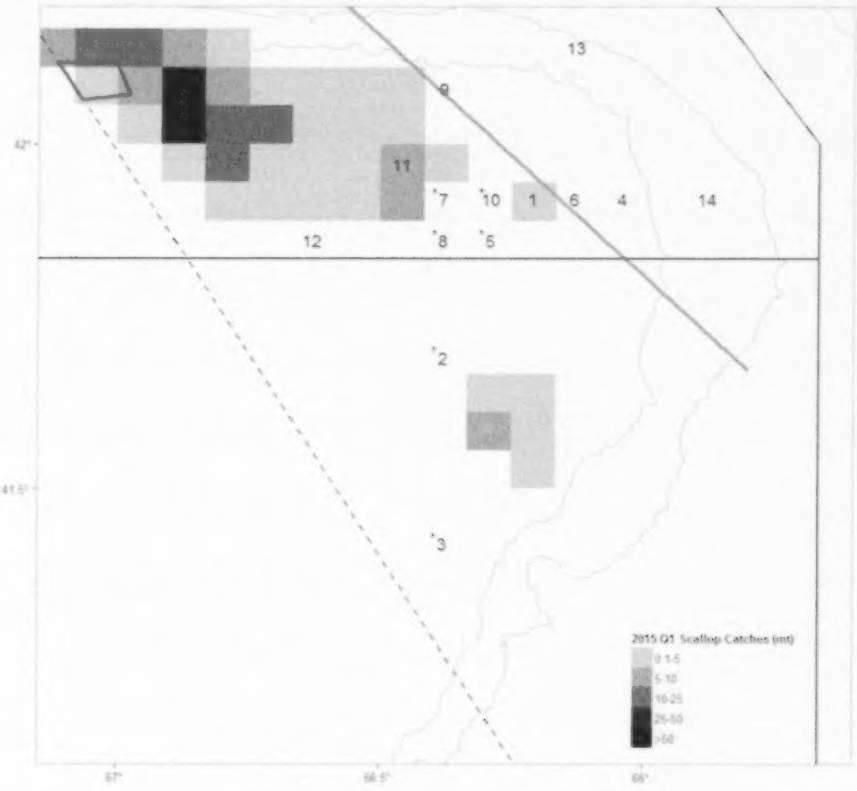

Figure 2. Distribution of Eastern Georges Bank offshore scallop catches (mt of meat) by the Canadian scallop fishery during the first quarter of 2015. The 2 darkest cells have values of 27 mt and 29 mt. The industry-initiated scallop-fishery closure area in place for the first quarter of the 2015 scallop fishery is indicated by the blue box. The horizontal black solid line demarcates NAFO divisions 5Zj and 5Zm. The diagonal red line demarcates the Georges Bank scallop management areas 'a' and 'b'. The diagonal dashed line indicates the Canada/USA ICJ line. Numbers 1 to 14 represents the ranked cod cells from Figure 1.

Conclusions

A cod area/time closure based on the top ranking cells would have a relatively low impact on the offshore scallop fishery provided the 2016 first quarter scallop fishing distribution is similar to that of the first quarter in 2015.

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Sources of Information

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